# Railway track for vehicles with various means of locomotion and drive systems, and vehicle for traveling on said railway track

## Field of the Invention

**[0001]** The present invention relates to a railway track, which may be traveled by vehicles, such as motor vehicles, rail vehicles, and/or magnetic levitation vehicles having various means of locomotion and drive systems, such as a road wheels, flange wheels, and magnetic levitation technology.

## Background of the Invention

**[0002]** A multipurpose vehicle for using individual different and independent roadways is known from DE 101 25 617 A1 and DE 101 60 247 A1.

**[0003]** This vehicle is alternatively designed for three types of locomotion such as wheel-road, wheel-rail, and magnetic levitation technology. It has a combined flange wheel and road wheel for the wheel-road and wheel-rail types of locomotion. For use as a magnetic levitation vehicle, at least four supports having current-carrying magnetic coils which may be extended and/or pivoted out are situated on both sides on the chassis and asynchronous short-stator motors are situated on the sides.

**[0004]** For the transition from one type of locomotion to the other, ramps are used, at which the roadways may be lowered in relation to one another. To overcome uneven points, such as intersections, branches, and road transitions, parts of the roadways are also lowered or folded down in relation to one another.

**[0005]** The disadvantage of this system is that the vehicle is not optimally adapted to a magnetic levitation route and, in addition, this route may not be traveled by typical vehicles which are equipped with a drive system.

**[0006]** Furthermore, the same route may also not be alternatively traveled by vehicles of the types of locomotion cited.

**[0007]** It is thus generally known that motor vehicles having road wheels travel at ground-level on roads, or freeways, and other paths. However, it is not known that motor vehicles having road wheels may travel on a railway track without additional aid.

**[0008]** Furthermore, it is known that magnetic levitation vehicles are equipped with two-part magnetic levitation technology, such as the Transrapid, and travel on a magnetic levitation route. However, it is not known that motor vehicles or magnetic levitation trains having two-part or four-part magnetic levitation technology may travel on a railway track.

**Summary of the Invention**

**[0009]** It is the object of the present invention to provide a railway track for vehicles having various means of locomotion and drive systems, on which smooth transitions among roadways are possible using the same vehicle. The multiple usage of a railway track is to increase transport performance and protect the environment and resources. Moreover, a vehicle is to be provided, which is adapted in the most optimal way to this railway track and, if necessary, also manages without this railway track.

**[00010]** The object is achieved by the features according to the present invention of Claim 1. Advantageous refinements and embodiments are the subject matter of the subclaims.

**[00011]** The railway track comprises two rails, which are designed so that they may be traveled by vehicles having various means of locomotion and drive systems, the means of locomotion being able to be a road wheel, flange wheel, and/or an electromagnetic field. Every means of locomotion may be situated on the vehicle alone or in combination with another means of locomotion for traveling the railway track. The rails of the railway track have one or two wing-like extension arms for this purpose, which alternatively permit, in addition to travel using a road wheel, travel using a flange wheel and using magnetic levitation technology.

**[00012]** A winged rail of the railway track implemented in this way preferably comprises a stable double-T profile having a perpendicular traverse, a rail head arching up in the middle along the rail, supported by the traverse.

**[00013]** A winged railway track having a trimodal design of this type may be used for road, railway, and magnetic levitation vehicles. The necessity of constructing three different roadways is thus dispensed with in many cases, namely,

- one for motor vehicles,
- one for railway vehicles,
- one for magnetic levitation vehicles,

as has been practiced until now.

**[00014]** Thus, a motor vehicle having road wheels, flange wheels, or magnetic levitation technology, a railway vehicle having flange wheels, and a magnetic levitation vehicle having two-part or four-part drive may travel on the same railway track.

**[00015]** Using the new achievement of the object, significantly less land is constructed on and investment costs are saved.

**[00016]** Through the use of magnetic levitation technology in all vehicle species and adaptation of the travel velocities to one another, a multiple performance increase is achieved when using the winged railway track.

**[00017]** The use of magnetic levitation technology on the trimodal roadway according to the present invention, which may be erected on the rail network and/or on the freeway, results in halving of the travel and freight times and is highly advantageous for the national economy.

**[00018]** Since magnetic levitation routes have been implemented until now only for experimental purposes, these may be implemented at low outlay in connection with the existing routes and designed beforehand for trimodal use.

**[00019]** The new winged railway track thus offers multiple advantages and applications. It may thus be used by a vehicle having a trimodal drive systems, which is advantageous, for example, if one of the drive systems, such as the levitation technology, breaks down or the vehicle wishes to leave this route in order to be able to come closer to urban centers, for example.

**[00020]** For example, utility motor vehicles may be equipped with magnetic levitation technology, which are assembled to form trains which travel the winged railway track.

**[00021]** In addition, vehicles which either have only road wheels or only rail wheels may travel on the new route according to the present invention, which may be necessary for repair or detour trips, for example.

**Brief Description of the Drawings**

**[00022]** Several exemplary embodiments of the achievement of the object according to the present invention will be described in greater detail on the basis of the drawings.

**[00023]** **Figure 1** shows a schematic illustration of the winged railway track having a motor vehicle, which is driven to travel on the winged railway track using a road wheel,

**[00024]** **Figure 2** shows a schematic illustration of the winged railway track having a motor vehicle, which is driven using a flange wheel on the winged railway track,

**[00025]** **Figure 3** shows a schematic illustration of the winged railway track having a motor vehicle which is driven using a two-part or four-part magnetic levitation technology on the winged railway track,

**[00026]** **Figure 4** shows a schematic illustration of the winged railway track having a rail vehicle which is driven using a flange wheel on the winged railway track,

**[00027]** **Figure 5** shows a schematic illustration of the winged railway track having a magnetic levitation vehicle which is driven using a two-part or four-part magnetic levitation technology on the winged railway track,

**[00028]** **Figure 6** shows an embodiment of a switch for use with the trimodal vehicle drive system on the winged railway track.

**Detailed Description**

**[00029]** **Figure 1** shows a schematic illustration of a motor vehicle **1**, which travels on a winged railway track **2** driven by a road wheel **4**. The winged railway track **2** is equipped for alternative travel using three different travel systems.

**[00030]** To simplify the drawing, only one side of the vehicle **1** having a wheel **4** on an axle **3** is illustrated on a rail **7** of the winged railway track **2**.

**[00031]** The rail **7** is implemented in the form of a stable double-T profile having a perpendicular traverse **8**. The upper T-shape of the rail **7** has sufficient width so that the surface **9** thus formed, as shown in **Figure 1**, may be traveled using the road wheel **4**, but also using a rail vehicle (**Figure 4**) or a magnetic levitation vehicle (**Figure 5**).

**[00032]** A rail head **10** is arched in the middle of the surface **9** along the rail **7**, which is supported by the traverse **8**.

**[00033]** **Figure 2** shows a motor vehicle **1** which is driven using a flange wheel **5** and travels using its flange wheel **5** on the rail head **10**.

**[00034]** The road wheel **4** is implemented having twin tires, the flange wheel **5** being situated between the two twin tires **4**. The upper T-shape of the rail **7** is implemented as sufficiently wide so that the surface **9** thus formed may be traveled using the road wheels **4** and, in addition, the rail head **10** may be traveled using the flange wheel **5**. In this embodiment, the vehicle **1** may travel further on a normal road.

**[00035]** **Figure 3** shows a motor vehicle **1** on which additional magnetic levitation technology **6** is situated for locomotion as a magnetic levitation vehicle on the winged railway track **2**. The magnetic levitation technology **6** is implemented as a pivotable arm **11** and is used as a holder for a support electromagnet, a guide magnet, and an asynchronous short-stator motor **12**, which builds up an electromagnetic traveling wave field in relation to the rail

**7**. The support arms **11** are situated so they are retractable, in order that the vehicle **1** may also travel using the road wheel **4**.

**[00036]** **Figure 4** shows a vehicle **1** which exclusively travels as a rail vehicle using flange wheels **5** on the winged railway track **2**.

**[00037]** Finally, as **Figure 5** shows, it is also possible and expedient for high velocities for the vehicle **1** to travel purely as a magnetic levitation vehicle using magnetic levitation technology **6** on the winged railway track **2**.

**[00038]** For this purpose, the magnetic levitation technology **6** engages under the wing surfaces **9** of the rail **7** using its support arms **14**. Support electromagnets, guide magnets, and asynchronous short-stator motors **12** are situated on the support arms **14** of the vehicle **1** for the locomotion as a magnetic levitation vehicle.

**[00039]** **Figure 6** shows a switch **13** for the winged railway track **2**. It comprises flexible rail parts **15**, which are situated on a circular path so they are pivotable in pairs. In addition, a retractable rail part **16** is situated so it is foldable for the required length equalization of one of the rail parts. As an alternative to the flexible rails, the pivotable rail parts **15** may also comprise elements arrayed in a formfitting way and rotatable in relation to one another.

**List of reference numerals**

**[00040]**

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|---|---|
| vehicle | **1** |
| winged railway track | **2** |
| vehicle axle | **3** |
| road wheel | **4** |
| flange wheel | **5** |
| magnetic levitation technology | **6** |
| rail | **7** |
| traverse | **8** |
| upper surface of the rail | **9** |
| rail head | **10** |
| extendable support arm | **11** |
| support electromagnet, guide magnet, and asynchronous short-stator motor | **12** |
| switch | **13** |
| support arm | **14** |
| pivotable rail parts | **15** |
| retractable rail piece | **16** |